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This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations by the Du Pont Company. It also contains published reports of investigators at agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.



# AGRICULTURAL NEWS LETTER

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### FINE SAFETY RECORD ESTABLISHED BY INSECTICIDES IN HOME AND FARM

Modern insecticides have a fine safety record of use both in the home and in agriculture, and have saved millions of people from death or illness, Dr. Edward F. Knipling, in charge of the Division of Insects Affecting Man and Animals, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, said recently. He spoke as president of the American Association of Economic Entomologists at its 64th annual meeting in Philadelphia, December 15, 1952.

DDT alone, Dr. Knipling said, is credited with saving an estimated 5,000,000 lives and preventing at least 100 million illnesses.

"I am convinced," he said, "that today we have safer insecticides for controlling insects in the home than we had 10 years ago. We have synthesized pyrethrum, allethrin, and methoxychlor insecticides low in their toxicity to man and animals. The record of extensive and safe use for DDT, chlordane, and lindane is good. These newer insecticides have replaced almost completely the more toxic insecticides such as the arsenicals, fluorides, thallium, phosphorus and cyanide, which formerly were commonly used in homes for controlling household pests and disease carriers."

#### Insecticides Save Lives and Help Produce Crops

Dr. Knipling is a graduate of Texas A & M College and Iowa State College. His academic training was in the general field of agriculture, with majors in entomology and parasitology. He has been with the U. S. Department of Agriculture since 1931, and has been in charge of the Division of Insects Affecting Man and Animals since 1946. Dr. Knipling has published about 100 technical papers in the field of medical and veterinary entomology. Both the United States and Great Britain have honored him for work done in the control of typhus and other insect-borne diseases in World War II.



Speaking at Philadelphia on the subject of "The Greater Hazard--Insects or Insecticides?" Dr. Knipling's talk included the following remarks:

"Alarmists are telling the American people that insecticides are the greater danger. They claim that we're being poisoned by the new chemicals.

"I have come to the conclusion that such fears for the most part result from a misinterpretation of laboratory toxicity data in terms of insecticide hazards to man. Data obtained in experiments on laboratory animals do not give us a true measure of the insecticide's hazard to man, and should not be used as reason for sounding the alarm. How the insecticide is used to control insects largely determines its toxicity hazard.

Insecticides Properly Investigated for Toxicity

"We, as entomologists, must not underestimate our responsibility to the public in seeing that insecticides are used safely. I am convinced--and our record supports this conviction--that we have not neglected the responsibility of demanding adequate information about the toxicity of insecticides before making recommendations for their use.

"On the other hand, I wonder if the general public is fully aware of our parallel responsibility of helping to adequately feed and clothe people by controlling the pests that destroy agricultural products.

"When we consider our insecticides as man-savers rather than as man-killers, it calls for an entirely different outlook on the matter of calculated risks in employing insect control chemicals.

"In the field of medically-important insects, we are constantly faced with this decision. Is it better to recommend using a chemical having a calculated health risk or to deny people the protection this chemical can give them against a disease carrier?

### Unprecedented Usefulness of Insecticides

"We have faced and answered this question ourselves many times during the past 10 years--a decade that has witnessed not only the development of most of our new insect killers, but also World War II and the Korean conflict. All previous wars have caused great increases in the incidences of insect-borne diseases. During this decade unprecedented and highly successful use of insecticides has been made to protect our fighting men and the citizens of our own and allied countries from malaria, louse, and mite-borne typhus, and many other disease organisms transmitted by insects, ticks, and mites.

"DDT has come under heavy fire from those who believe that this insecticide, for some purposes at least, constitutes too great a health risk to permit its use in the manner now advocated for controlling insects which affect man. This attack goes on despite DDT's fine record in protecting people throughout the world from disease-carrying insects. How many illnesses--how many deaths--would you say that the use of DDT has prevented? On the basis of discussions with several authorities on insect-borne diseases I estimate that no less than 5 million lives have been saved; no less than 100 million illnesses have been prevented through the use of DDT\* for controlling malaria, typhus, dysentery and many other diseases since it became available about 1942.

"To my knowledge not one death (excluding accidental deaths) or serious illness has been caused among the people exposed to the insecticide in connection with the control of insects.

### Common Chemicals More Lethal than DDT

"We can expect almost any insecticide to cause death under conditions of gross carelessness or when people make suicidal attempts. However, reported cases

of accidental deaths due to DDT in my opinion have been few in number in spite of the extensive handling and use of these insecticides. According to Simmons and Hayes\*\* (Soap and Sanitary Chemicals, December 1951) 14 deaths have been listed as resulting from DDT, but they indicate that in most cases the solvents played an important if not deciding role.

"What is the record for other common chemicals? Vital statistics published by the Federal Security Agency for one year, 1949, show that aspirin was responsible for 70 accidental deaths, lye and similar chemicals for 87, kerosene and other petroleum products for 117, and barbituric acid and derivatives for 466.

"As entomologists, we may well be proud of our achievements in improving the health and living standards of our fellow men through insect control. But let us remember that these achievements would not have been possible without the contributions of chemists and toxicologists. Further progress in developing effective and safe insect control chemicals will require even more help from these specialists. The rapidity of future progress will depend in large measure on how well the research of entomologists, chemists, and toxicologists is coordinated."

\*Dr. Knipling said he arrived at these estimates following discussions with Colonel W. S. Stone, Commandant, Army Medical Services Graduate School; Dr. F. C. Bishopp, Bureau of Entomology and Plant Quarantine; and Dr. S. W. Simmons, U. S. Public Health Service.

\*\*\*"Relative Toxicity of Insecticides" by Samuel W. Simmons (scientist director) and Wayland J. Hayes, Jr., (senior surgeon), Communicable Disease Center, U. S. Public Health Service, Savannah, Ga.



### FEED PRODUCTION INCREASED BY LEAFHOPPER CONTROL IN ALFALFA

Wisconsin leads the nation in the production of high quality legume hay, harvesting about 3,700,00 acres annually. There are over 900,000 acres of alfalfa and approximately 2,800,000 acres of clover-timothy; each acre produces nearly two tons of dry hay each year.

Yet, in spite of the high yields, two staff members of the University of Wisconsin are not satisfied that their fields are realizing as many pounds of total digestible nutrients as is desirable or possible. Professor John T. Medler, Department of Agronomy and Entomology, and Ellsworth H. Fisher, Wisconsin extension entomologist, have observed that in many years leafhopper injury affects the quality of the crop. They recognize that insect-injured hay is often of poor quality, whereas alfalfa protected from leafhopper is of higher feed value on a comparable pound-for-pound basis.

During 1952 there were relatively high infestations of leafhoppers throughout most of central and southern Wisconsin. Medler and Fisher conducted tests to show dairymen that leafhopper control is an excellent means of boosting feed yields per acre. Both Du Pont "Marlate" 2-MR methoxychlor insecticide and emulsifiable parathion were included in the demonstrations. Applications were made on the second growth about two weeks following the harvest of the first cutting, at the rate of one pound of active methoxychlor per acre (2 quarts "Marlate" 2-MR) or one-quarter pound of parathion, each in ten gallons of water, applied by means of a low-volume sprayer.

### Satisfactory Results Shown

Results were satisfactory in all tests, with equivalent hay yields obtained with both test insecticides. In one Outagamie County demonstration, for example, 160 bales were obtained on four acres of alfalfa not sprayed with insecticide in comparison to 220 bales harvested from another four acres that were protected by methoxychlor. The increase was 15 bales or about one-half ton of alfalfa per acre.

In one Mazomanie County demonstration, 82 bales were produced versus 134 bales in a comparable adjacent area where methoxychlor was used.

### Hay of Improved Quality Produced

In order to show that the improved quality of the hay is of as much importance to dairy farmers as increased yields, samples of treated and nontreated hay were sent to a commercial laboratory for complete feed analysis. The first table shows a pound-for-pound comparison of untreated versus methoxychlor-treated hay. In this particular field, leafhopper injury was of the type that is frequently seen in central Wisconsin and not rated as being particularly serious by farmers who do not realize the loss that leafhoppers can cause.

EXPERIMENTS CONDUCTED BY J. T. MEDLER & E. H. FISHER, UNIVERSITY OF WISCONSIN 1952

SCHLOUGH FARM, MAZOMANIE, WISCONSIN - "Mariate" 2MR Methoxychlor insecticide at 2 qts./acre

Middle Second Cutting - Moderate Injury of Type Seen in Wisconsin in Many Years

Yield Check = 1 1/2 ton/acre : value \$12.00  
Yield Treated Hay = 3/4 ton/acre : value \$18.00

\$6.00 worth of high quality hay will replace about \$12.00 worth of concentrate feed

FEED ANALYSIS			GAIN FROM TREATMENT		
	Check \$/unit wt.	Treated \$/unit wt.	Check - Nutrients lbs/acre	Treated - Nutrients lbs/acre	Lbs. Increase per acre
Protein	16.05	18.40	160.5	276	111.5
Fat	2.20	2.15	22	32.3	10.3
Fiber	28.95	29.70	289.5	445.5	156.0
Ash	5.67	5.92	56.7	88.8	32.1
Moisture	8.90	9.00	89.0	135.0	46.0
N.F.E. (1)	38.23	34.83	382.2	522.2	140
(N.F.E. (1) plus Fiber)			672	968	296
Carbohydrates	67.18	64.53			
Vitamin A					
(2) I.U. per pound	13,350	26,700	13,350,000 (2) (I.U. per acre)	40,050,000 (I.U. per acre)	26,700,000
(1) nitrogen free extract					
(2) International units					
					\$ 7.14
					Approx. 5.00 = cost of fat plus carbohydrate
					3.47

Table 1



Notice that there is a significant increase in protein and in the Vitamin A content. When the feed analysis is taken into consideration with the weight comparison, it will be seen that leafhoppers were the cause of only 160 pounds of protein being produced per acre whereas 276 pounds of protein per acre were produced where leafhoppers were controlled.

#### Good Returns on Insecticide

When the dairyman buys concentrated grain feed, the principal source of protein content is frequently soy-bean oil meal or cottonseed meal. Based on the price of these commodities, the pounds increase of protein alone is worth nearly \$7.00. The increase in the fat and the carbohydrate in terms of corresponding components in dairy cow feed concentrate is approximately \$5.00. Table 1 indicates that the use of \$2.00 worth of insecticide can result in the production of the equivalent of \$12.00 worth of purchased nutrients.

The return on the insecticide cost can be examined from still another point of view. Hay in Wisconsin costs about \$24.00 a ton. The yield increase alone was worth about \$6.00 (see table 1), but since the quality of the hay was superior, the monetary return is actually greater than the weight alone would indicate.

#### Results Where Damage Was Severe

The contrast is even more striking when a comparison is made where leafhopper damage was severe. (See table 2.) The protected portion of the field yielded one ton per acre as against one-quarter ton per acre where leafhopper caused injury. The difference in feed value is readily seen in the analysis. When yield and analysis are considered together, increase of pounds of actual nutrients is striking. The increase in protein alone is almost four times as much as the total protein on the check field. Total fat and carbohydrate also show great increases percentagewise. If the farmer had to replace his loss in terms of ground grain concentrate, he would find that \$2.00 worth of insecticide saved him about \$35.00, or in terms of high-quality alfalfa hay purchased in the market, about \$18.00.

Although Wisconsin is a land of plenty when it comes to hay production, Medler and Fisher believe that an annual program of preventing leafhopper buildup and damage will more than pay for itself. More total digestible nutrients can be produced per acre, and the farmer may be able to divert some of his alfalfa land to other uses.

SCHLOUGH FARM, MAZOMANIE, WISCONSIN  
 "Marlate" EMR Methoxychlor insecticide at 2 qts./acre  
 Early Second Cutting - Severe Leafhopper Injury Typical of Damage  
 Seen Throughout Central Wisconsin in 1952

Yield Check = 1 1/4 ton/acre (\$6.00)  
 Yield Treated Hay = 1 ton/acre (\$24.00)

\$18.00 worth of alfalfa hay replaces about  
 \$35.00 worth of concentrate

# FEED ANALYSIS

	Check \$/unit wt.	Treated \$/unit wt.	Check - Nutrients lbs/acre	Treated Nutrients lbs/acre	Lbs. Increase per acre	\$ value nutrient increase
Protein	14.90	18.70	74.5	374	299.5	19.00+
Fat	2.20	2.20	11.0	44	33.0	16.00 <sup>1</sup>
Fiber	35.85	41.70	179.3	834	654.7	= cost of fat plus carbohy- drate
Ash	5.43	6.72	27.2	134.4	107.2	-
Moisture	9.70	8.40	48.5	168	119.5	-
N.F.E. (1)	31.92	22.28	159	445	286	-
(N.F.E. (1) plus Fiber)						
Carbohydrates	67.77	63.98	338	1,279	941	-
Vitamin A						
I.U. per pound	11,400	26,700	5,700,000 (2) (I.U. per acre)	53,400,000 (I.U. per acre)	47,700,000	6.20

Good grade midwestern alfalfa hay is selling for \$24.00 loaded in the field.  
 "Cow Concentrate" (640 lbs. protein, 30 lbs. fat, 820 lbs. carbohydrate) sells for \$108.80.

+ based on soybean oil meal  
 based on price of "cow concentrate" less protein component

- (1) nitrogen free extract
- (2) International units

Table 2

INSECTS CAUSED SOME LOSSES  
ACTUALLY BLAMED ON DROUGHT

Leafhoppers, spittlebugs, and weevils have been lowering both the tonnage and nutritional value of alfalfa, Dr. Robert P. Holdsworth, Jr., of the Grasselli Chemicals Department of the Du Pont Company told the national convention of the American Dehydrators' Association at Phoenix, Arizona.

The insects were blamed for hidden losses which have affected alfalfa dehydrating operations.

"I have seen severe damage to alfalfa crops that was blamed on drought or boron deficiency," Dr. Holdsworth declared, "when in fact the damage was caused by the leafhopper."

More than a half-million acres of forage crops were sprayed with insecticides in five eastern and middle-western states this past summer to control these pests, it was reported.

Not enough research work has been carried on to know the extent of damage by these insects in the mountain and plains states of the West, Dr. Holdsworth said. He urged dehydrators, agricultural colleges, and state experimental stations to cooperate in spraying tests during the coming summer, so proper methods of control can be established for each section of the country.

While a number of the newer insecticides will control these pests, certain sprays leave toxic residues which might render crops such as alfalfa unfit for feeding to dairy cattle, to beef cattle within 30 days of slaughter, or for processing into products for human consumption.

One of the most effective chemicals for killing these insects, and one which can be applied without presenting these hazards, is an emulsifiable formulation of methoxychlor, Dr. Holdsworth stated.



ATMOSPHERE FAVORABLE FOR  
TALENT DEVELOPMENT NEEDED

A pressing shortage of management personnel was seen here as threatening future development of the country.

Management leadership in all branches of society is the future's most imperative need, Crawford H. Greenewalt, president of the Du Pont Company, said, warning that there must be an atmosphere in which talent is encouraged to develop.

Mr. Greenewalt addressed the Sixth Annual Forecasting Conference of the Greater Philadelphia Chamber of Commerce on January 14.

"A never-ending game of hide and seek" is proceeding, he said, to provide the human resources needed for leadership for business as well as for government, military, academic, and professional groups. Maintenance of adequate incentives to induce the continuity of management growth is "the most important problem" faced today.

"The need for competent people is increasing by leaps and bounds as our population grows and as the number of our cooperative ventures increases," he said.

Problem of Finding Leaders Never Ends

"This question of finding competent leadership for government, for education, for our armies, for the arts, and for business and industry is never ending," he said. "All are seeking, all are competing -- for in no age has the supply ever been too large."

Men in management now "can see that the future of our own companies, and of business generally, must depend importantly upon the caliber of those who follow us -- 10, 25, and 50 years hence," he said.

"We must seek out and compete for our share of able and talented young people," he declared. "It is our responsibility to bring in as large a crop of promising material as we can, and to provide an environment in which the leaders of the future will mature."

Growth in size and complexity of industry has resulted in a new profession -- business management -- he pointed out. He noted that for many years leaders have been developed in war, in government, in the church, and in education.

"Now it has become necessary to supply leaders for the large-scale enterprise that business has become," Mr. Greenewalt continued. "And here the task of leadership is particularly difficult, for it is necessary for business management not only to grasp the increasingly complex tasks of the present but so to plan that managerial competence will continue long into the future."

### Present Philosophy of Taxation Reduces Incentives

However, in business management the most powerful inducement to undertake the hard, critical jobs -- the financial incentive -- is being "drastically reduced in importance" by the present philosophy of taxation, Mr. Greenewalt said. In other fields, a variety of intangible incentives have developed over the years, such as the personal prestige, degree of leisure, and cultural environment of the academic world, he pointed out. But business, for the most part, is largely anonymous and has little to offer in the way of comparable intangibles.

Requirements for leadership in industry are growing more exacting and will continue to do so, which "means that qualified candidates will become more scarce and that competition within industry for top-flight men will increase," Mr. Greenewalt declared.

"So the decline in financial incentive is a matter of grave concern. It is of concern not only to our business, but to all business, and to the nation.

"As steeply progressive income taxes eat away at these incentives, more of our able young people will seek other fields, so fewer of those who are with us will be urged on to those extra efforts that are the difference between success and mediocrity. More will be led to accept a dubious security in place of risk and accomplishment."

### Crushing Taxes Have Little Effect on Lower Rates

It is not a question of a choice between incentives for business and abandoning government work because "there is no such issue," he asserted. "Crushing taxation in the upper brackets has little effect upon the rates which those at the lower levels must pay."

"I worked out a little demonstration of this the other day," Mr. Greenewalt said. "Last year our officers and principal top officials, numbering 40, received 1.6 per cent of our annual payroll. Our upper management group directly below this level, numbering about 300, received 2.7 per cent.

"Let's assume that a tax of 30 per cent is to be levied on the entire payroll, or in other words, that Du Pont employees, considered as a taxable community, are to produce that much in tax revenue, in one way or another. We could, of course, simply tax each man 30 per cent of his pay. If we followed current tax practice, however, we would hesitate to take this step on the grounds that the upper-level incomes should bear a heavier burden. So we assess those in the highest income group 90 per cent, and those in the second group 60 per cent. Theoretically it would be argued that this would materially reduce the assessment of the rest.

"But the fact is that the inequitable tax at the upper levels will reduce the liability of the lower by only three per cent. And the national figures are not substantially different," he said. "Surely this is a small return for having seriously crimped the incentives of the management group," Mr. Greenewalt declared.

"Without attempting to prophesy, I look upon diminishing incentive as perhaps the most serious possibility now facing business," he said. "If financial reward is absent, or is greatly reduced, the number of candidates for management positions will decrease. And business will be that much less able to fulfill its responsibilities to the nation."

The American economy is strong "because we have created an atmosphere under which the incentive to human achievement has been given the widest possible scope. We have become strong because we have provided whatever incentives were needed to make our people do their best. We will become weak when we turn our backs on the great and compulsive force of self-interest."

#### DUSTLESS SEED DISINFECTANT

Du Pont research has developed a new dustless fungicide called "Arasan" SF-X seed disinfectant. This new formulation of "Arasan" is designed for use in slurry treaters, but is adaptable for use in seed blenders or batch mixers.

"Arasan" SF-X has these advantages:

1. It retains the effectiveness and safety toward seeds of "Arasan" SF, the formerly used product.
2. It is dustless--easier and more pleasant to handle in getting ready to treat seed.
3. It goes into suspension readily.
4. It adheres tightly to the seed. Workers who have used it find no dust problem in treating, bagging, or handling bagged seed.
5. It doesn't dry out and dust off when treated seed is re-packaged in dealers' stores or when farmers plant.

A folder about "Arasan" SF-X will be sent to those requesting it from the Editor of the AGRICULTURAL NEWS LETTER.



## AMINO ACIDS AND THE PROTEIN PROBLEM IN HUMAN NUTRITION

The importance of certain amino acids -- nature's building blocks for body tissue -- as "a means of extending the food resources of the world" was pointed out by Dr. N. W. Flodin of the Electrochemicals Department of the Du Pont Company to members of the American Association for the Advancement of Science at that group's annual meeting in St. Louis, Mo., on December 26, 1952.

Of the eight amino acids considered essential to human nutrition, the four most needed for improvement of the diet are lysine, methionine, threonine, and tryptophan, Dr. Flodin stated.

"All four of these essential amino acids have been made synthetically and are potentially available for improvement of the human diet," he said, "and one, methionine, is currently being manufactured by two companies in commercial quantities for use in poultry feeds." He added that Du Pont has a wide interest in this field and has done extensive research on both lysine and methionine.

### Majority of Human Race Suffers Diet Deficit

In many instances, Dr. Flodin said, the effective supply of dietary protein could be increased by as much as 50 to 100 per cent by amino acid supplementation, with marked benefit to human health.

"In areas where foods derived from wheat are important staples, substantial over-all improvement in protein nutrition could be realized by fortification with lysine," Dr. Flodin said. "Diets consisting largely of rice would require supplementation with lysine and threonine, while those dependent on corn could be improved by addition of lysine and tryptophan." Where root or legume proteins such as those in beans and potatoes are leading staples, fortification with methionine or combinations of methionine with lysine and tryptophan could accomplish similar results, he said.

Dr. Flodin pointed out that a deficit of food protein today afflicts the great majority of the human race, the most seriously affected being inhabitants of Asia, Africa, people of the West Indies and Central America, and large groups in South America and Europe.

"However, even in the United States and other countries of relatively high average nutritional status," he said, "substantial portions of the population are found to be receiving too little protein or too poor a quality of protein for proper health. Under these conditions, food protein must be looked upon as a limited natural resource requiring conservation and the most efficient possible use."

### Protein Problem to Become Increasingly Acute

"Retarded growth, deficient muscle development, small adult size, and reduced resistance to infections are among the usual results of inadequate protein nutrition as shown in the medical and nutritional literature," Dr. Flodin stated.

"The areas of the world where malnutrition is prevalent are those where low quality proteins predominate in the diet."

The protein problem will become increasingly acute in the years ahead, he said, because of the difficulties in bringing additional land under cultivation to keep pace with the rapid increase in world population.

"The rapid progress of nutrition research," he said, "now makes it possible to increase greatly the nutritive value of present protein resources, as evidenced by the work that has been done thus far on essential amino acids, so that the devitalizing effects of chronic protein deficiency may be largely overcome."

#### CONSTRUCTION OF METHIONINE PLANT TO START AT BEAUMONT

Construction is scheduled to start this spring on the first of the manufacturing units to be located on the Du Pont Company's site near Beaumont, Texas.

The plant, located on a tract four miles southeast of Beaumont, will provide facilities for the synthesis of methionine, an essential amino acid of nutritional value as a feed supplement for poultry and other animals. It will be operated by Du Pont's Organic Chemicals Department.

Investigators in animal nutrition have long known that methionine is one of the essential amino acids. However, it remained for nutritionists collaborating in this work to prove the increased value of feed fortified with proper amounts of synthetic methionine.

#### Many Tests Made With Poultry Feeds

Tests have demonstrated that the addition of methionine to poultry feed formulas results in greater feed efficiency. Results on large-scale use show constant gain in weight and better feathering at a significant saving in feed.

Cost of the initial installation at Beaumont is estimated at approximately \$4 million. The methionine unit is but one of a number of manufacturing facilities which Du Pont plans to erect in the future on the Beaumont site. It is expected to go into production late in 1954 and to employ over 100 when in full-scale operation.

Buildings at the Beaumont site will conform to the modern open-air type chemical design, suitable to a southern climate.

NEW DU PONT INSECT AND  
DISEASE SEED PROTECTANT

A new seed treatment material, combining a fungicide with an insecticide, is available to farmers in time for 1953 spring planting, it was announced by agricultural specialists of the Grasselli Chemicals Department of the Du Pont Company.

The blending of the two chemicals for plant protection resulted from tests conducted over the past several years by Du Pont investigators and by agricultural experiment stations in a number of states.

New York experiments(\*) have shown that seed corn maggot could be controlled by treating bean seed with any of several insecticides. California investigations(\*\*) with lima beans showed good control of both wireworms and seed corn maggot when lindane was used. Work in the control of various corn rootworms has been carried on in Iowa, North Carolina, and Louisiana. Other soil pests have been controlled through seed treatment in Pennsylvania and New Jersey experiments.

Greater Protection Afforded to Seed

Treatment of seed with chemical fungicides has been an accepted agricultural practice for many years. Such fungicidal treatments protect the seed and seedling from the attack of organisms causing seed rot, seedling decay, or "damping off", and insure a better stand of healthier plants. When seeds are treated with insecticides alone, chemical injury to the seed sometimes seriously cuts down on germination and seedling development. Yet when a good seed protectant, such as the organic sulfur material known as "Arasan" seed disinfectant, is combined in proper proportion with an effective insecticide, such as lindane, each chemical is able to do its job of seed protection without the risk of injury.

To provide growers with the proper blend of chemicals to do this double-duty seed treatment job, Du Pont chemists have combined a new dustless formulation of "Arasan" with lindane under the name of Du Pont I & D (insect and disease) Seed Protectant. Small quantities of seed may be treated by hand, or large amounts may be treated by commercial seedsmen with slurry treating equipment.

The new material is recommended for use on corn and beans in many areas where both disease and insect onslaught have prevented growers from getting consistently good stands of these crops. It is also being tested for use with other crops.

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(\*) Experiments conducted at the New York State Agricultural Experiment Station at Geneva, N. Y. were described in the September-October, 1951 issue of the AGRICULTURAL NEWS LETTER.

(\*\*) California field trials, carried out under the auspices of the College of Agriculture of the University of California at Davis, were described in the November-December, 1951 issue of the AGRICULTURAL NEWS LETTER.

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### MANY FARM NEEDS MET BY FLEXIBLE PIPING

Flexible plastic piping now manufactured by various companies from Du Pont "Alathon" polyethylene resin is helping many farmers solve their water piping problems.

Among the advantages are lightness in weight, resistance to corrosion, and simplicity of installation. Pipe made from "Alathon" weighs only one-eighth as much as steel pipe of comparable capacity.

Because this new type of piping comes in rolls up to 400 feet in length, the need for many fittings formerly found necessary in most rural water systems is eliminated. When used in driven wells, for example, "Alathon" piping is attached to the jet head and lowered into the casing. The next connection generally is with the pump itself. It can also be used to replace corroded and worn-out sections of existing water systems, since fittings to adapt it to metal pipe are readily available.

### Frozen Pipes No Problem

Since "Alathon" piping is flexible and somewhat elastic, frozen water within the pipe will not cause it to rupture. Unlike metal piping, "Alathon" resists corrosion through both chemical and electrolytic action. The resistance to chemical corrosion is of particular importance in farm water systems where provision for filtering is difficult or impossible. Its resistance to electrolytic corrosion means that no special care is needed to avoid damage from this factor in making buried installations.

### New Uses Being Found

Many other agricultural applications have been found for pipe made of "Alathon". It is already in use in radiant heating systems both in homes and in broiler plants on chicken farms. Moisture does not cause "Alathon" to deteriorate. It has excellent electrical insulating properties, so for these reasons it has been used successfully as electrical conduit in humid areas such as broiler houses. It has been found useful, too, in loading planes with compounds used in spraying, dusting, and seeding. Because of its corrosion resistance and lightness in weight, it is also used in connecting the plane's tanks with the distributors under the wings.

### EPN SUCCESSFULLY TESTED FOR MOSQUITO LARVAE CONTROL

EPN Insecticide has "proved highly successful" in California tests for mosquito larvae control, according to United States Department of Agriculture entomologists. The tests were conducted to see if EPN would be effective on mosquito larvae which had developed a resistance to chlorinated hydrocarbon insecticides such as DDT.

EPN, or ethyl-p-nitrophenyl thionobenzenephosphonate, is an organic compound of phosphorus. It was first synthesized in a Du Pont laboratory in 1947 and placed on the market in 1950.

#### Small Doses Proved Effective

The Bureau of Vector Control of the California Department of Health, the Kern County Mosquito Abatement District of the California Mosquito Control Association, and the U. S. Department of Agriculture's Bureau of Entomology and Plant Quarantine, working together, found that about one ounce per acre of active EPN applied by plane or ground sprayer gave almost complete kills of the resistant larvae. This effectiveness at extremely low dosages is an important factor in its safe use as only small amounts of the actual chemical are applied at a time.

The Department of Agriculture said that the limited field tests with EPN, carried out in the Kern district in June, 1952, turned out so well that the district, working under an experimental permit issued by the state, used EPN to control mosquitoes in rural areas.

Mosquitoes resistant to DDT were noted in California in 1948, two years after DDT came into widespread use. Since then the state abatement districts have substituted others of the chlorinated hydrocarbon group of insecticides for DDT, only to find that in many cases DDT-resistant mosquitoes soon became resistant to the newer compounds. In some areas of the Kern district, as much as two pounds of actual DDT per acre failed to control resistant mosquitoes in 1952.

#### Three Phosphate Compounds Tested

In both laboratory and field tests, EPN proved the best of three phosphorus compounds under test, although the other two, malathion and NPD, also gave good control, according to the USDA. Laboratory tests proved EPN to be many times more toxic than DDT to the resistant strains of mosquito in California.

Although the control operators applied the chemical at the rate of 1.2 ounces per acre, tests by entomologists indicate that under some conditions as little as seven-tenths of an ounce from the air and less than six-tenths of an ounce with ground sprayers will give good control.

USDA entomologists said that as more is learned about EPN, its use may be permitted in other areas of the United States by men trained in mosquito control techniques. Experience thus far indicates that it can be used without

hazard if applied under the supervision of persons experienced in the use of mosquito control insecticides. The Du Pont Company, since it introduced EPN, has always stressed that it should be handled as carefully as any other organophosphorus compound. Operators handling it should wear protective clothing and respirators designed for combined dust and organic vapor, and should avoid exposing themselves to dust, spray, or fumes.

#### ADVANCE OF CHEMISTRY TEACHING TO BE AIDED BY DU PONT GRANTS

A new program intended primarily to assist and advance the teaching of chemistry in American colleges and universities will be begun by the Du Pont Company next fall. Thirty-two institutions will receive new fellowships or grants for the next academic year.

In one plan under this program, grants of \$2,500 each have been made to 19 four-year private colleges to help them maintain their outstanding performance in the training of students majoring in chemistry. They are Amherst College, Amherst, Mass.; Antioch College, Yellow Springs, Ohio; Carleton College, Northfield, Minn.; College of Wooster, Wooster, Ohio; Dartmouth College, Hanover, N. H.; DePauw University, Greencastle, Ind.; Franklin and Marshall College, Lancaster, Pa.; Haverford College, Haverford, Pa.; Juniata College, Huntingdon, Pa.; Middlebury College, Middlebury, Vt.; Monmouth College, Monmouth, Ill.; Oberlin College, Oberlin, Ohio; Pomona College, Claremont, Calif.; Reed College, Portland, Ore.; St. Olaf College, Northfield, Minn.; Swarthmore College, Swarthmore, Pa.; Union College, Schenectady, N. Y.; Wabash College, Crawfordsville, Ind.; and Wesleyan University, Middletown, Conn.

The funds are to be used according to the judgment of the colleges themselves as to what will best advance teaching and stimulate interest in chemistry. This includes such things as purchase of equipment or books; paying for visiting lecturers; trips by staff members to scientific meetings; and student aid.

This plan is not only a recognition of the important place in American education held by the colleges, but especially of their success in training high-quality graduates in science and sending them on to graduate schools.

#### Second Plan Offered to Thirteen Universities

In the other plan, the company has awarded postgraduate fellowships to these 13 universities: California Institute of Technology, Cornell University, Indiana University, Iowa State College, Massachusetts Institute of Technology, The Ohio State University, Purdue University, State University of Iowa, University of Illinois, University of Kansas, University of Minnesota, University of Nebraska, and University of Wisconsin.



Each of these new postgraduate teaching fellowships provides \$2,400 for unmarried fellows and \$3,000 for married fellows, plus an award of \$500 to the university and payment of tuition and fees. They have been offered to the chemistry departments for award to outstanding graduate students who have had two years' experience as half-time teaching assistants. Recipients would be required to continue to teach on a half-time basis during the period of their appointment.

By means of the fellowships, it is expected that the universities can take advantage of the teaching experience gained by these men instead of losing it, as is generally the case now. Much of the laboratory instruction in undergraduate chemistry courses in big universities is given by graduate students who have had little or no experience in teaching. After two years of this, most of the graduate students drop the teaching and devote their full time to study and research. Thus the benefit of their accumulated experience and advanced training is lost to teaching.

These new plans broaden the company's present program of support for postgraduate study and fundamental research in the universities. An authorization of about \$600,000 was provided by Du Pont for the new assistance and to continue its previous programs for fellowships and grants-in-aid for the academic year of 1953-54.

#### Industrial Aid of New Type

The new plans result from nearly a year of discussions with educators, other companies, foundations, and government agencies concerned with education and research, to determine appropriate and effective means by which Du Pont could aid education further. The need for assistance to advance the teaching of chemistry became evident during this survey. Du Pont officials said this is the first time industrial aid programs of this type have been offered, so far as they could learn.

"Teaching is a field which merits industrial support," Crawford H. Greenewalt, president of the Du Pont Company, said. He pointed out that research and graduate study in science are supported "on a large scale" in the universities by the government and other organizations, supplemented by industry, such as Du Pont grants-in-aid of fundamental research in chemistry.

"Teaching as such is not supported by these agencies," Mr. Greenewalt said. "Yet, the maintenance and encouragement of high-quality teaching is vital to the future supply and quality of scientists and consequently research."

#### Detailed Use of Funds Controlled by Recipients

As is the case with its long-standing program of fellowships and grants-in-aid, Du Pont is making the new awards to the institutions selected and leaving the decisions on detailed use of the funds up to them. Under the older program, the company has renewed its awards of postgraduate fellowships in scientific fields, granting 38 in chemistry, 15 in chemical engineering, five each in physics and mechanical engineering, three in metallurgy, two in biochemistry, and one in biology. It also continued its grants-in-aid of \$15,000 each to ten universities and \$10,000 each to five universities for fundamental research in chemistry.

## DU PONT DEVELOPS NEW SPRAY FOOD FOR PLANTS

A new plant food which the home gardener may either spray on the leaves or apply to the soil has been announced by the Du Pont Company. It should be available to home owners through garden supply stores in time for gardening activities this year.

The new product, Du Pont Soluble Plant Food, will supply nitrogen, phosphorus, potassium, and essential trace elements. It may be used as a fast-acting, clean, odorless spray for house plants, roses, ornamental shrubs, flower beds, vegetable gardens, fruit trees, berries, shade trees or lawns.

### Nitrogen Included In New Product

Nitrogen is the element made most readily available through the new Du Pont plant food. While there are around 75,000,000 pounds of nitrogen in the air above each acre of land, only a few plants, such as beans, peas, and clover, are capable of utilizing this elemental atmospheric nitrogen. However, certain nitrogen compounds sprayed on leaves move rapidly through the leaf surfaces and the nitrogen quickly becomes available for plant growth.

The Du Pont material may be applied as a spray by adding a tablespoonful per gallon to the spray tank when other pesticides are being applied, by using a siphon bottle attached to the garden hose nozzle, or may be sprinkled on with a sprinkling can. Applications at two-week intervals during spring and summer are suggested. The plant food may also be applied to the ground around trees and plants.

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